IN THE CLAIMS

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

Claims 1 and 2 (canceled).

3.   (currently amended)A disk array apparatus comprising:

a plurality of storage devices by which writing or reading data is executed in such a way that, when there is caused an error in writing or reading data into or from a storage area, writing or reading data is repeated again until completed and thereafter notifying that writing or reading data has been normally completed;

storage device control sections which include storing areas saving requests for write or read operations of data into or from said plurality of storage devices, controls write or read operation of data into or from said plurality of storage devices, and receives notification that the write or read operation of data into or from said plurality of storage devices is normally completed;

channel control sections which receives a request for write or read operation from a network outside the disk array apparatus itself;

a shared memory in which pieces of control information communicated by said channel control sections and said storage device control sections are stored;

a cache memory in which pieces of data for communication between said channel control sections and said storage device control section are temporarily saved; and

a connecting section connected to said channel control sections, said storage device control sections, said shared memory, and said cache memory,

wherein said storage device control sections generate logical storage areas using said storage areas in said plurality of storage devices, said logical storage areas being used for writing or reading data and having redundancy to store data,

wherein said storage device control sections monitor said storing areas in which a request for writing or reading data into or from the plurality of storage devices forming the logical storage areas is stored,

wherein among said plurality of storage devices forming said logical storage areas, said storage device control sections specify a storage device, for which the number of repeated times for reading or writing data is large, and block said specified storage device~~The disk array apparatus according to claim 1~~,

wherein said plurality of storage devices have redundancy~~,~~,

wherein said shared memory has areas which hold average response times for each of the plurality of storage devices~~,~~, and

wherein said storage device control sections compare said average response times among said plurality of storage devices with the redundancy when the storage device with a larger number of repeated times for writing or reading data is specified, and specify the storage device with larger average response time as one to be blocked.

4.   (currently amended)A disk array apparatus comprising:

a plurality of storage devices by which writing or reading data is executed in such a way that, when there is caused an error in writing or reading data into or from a storage area, writing or reading data is repeated again until completed and thereafter notifying that writing or reading data has been normally completed;

storage device control sections which include storing areas saving requests for write or read operations of data into or from said plurality of storage devices, controls write or read operation of data into or from said plurality of storage devices, and receives notification that the write or read operation of data into or from said plurality of storage devices is normally completed;

channel control sections which receives a request for write or read operation from a network outside the disk array apparatus itself;

a shared memory in which pieces of control information communicated by said channel control sections and said storage device control sections are stored;

a cache memory in which pieces of data for communication between said channel control sections and said storage device control section are temporarily saved; and

a connecting section connected to said channel control sections, said storage device control sections, said shared memory, and said cache memory,

wherein said storage device control sections generate logical storage areas using said storage areas in said plurality of storage devices, said logical storage areas being used for writing or reading data and having redundancy

to store data,

wherein said storage device control sections monitor said storing

areas in which a request for writing or reading data into or from the plurality of

storage devices forming the logical storage areas is stored,

wherein among said plurality of storage devices forming said logical

storage areas, said storage device control sections specify a storage device,

for which a number of repeated times is large, and block said specified

storage device~~The disk array apparatus according to claim 1~~,

wherein said plurality of storage devices have redundancy~~;~~, and

wherein said storage device control sections have areas which hold

queue numbers for each of the plurality of storage devices, compare said

queue numbers among said plurality of storage devices with the redundancy

when the storage device with a larger number of repeated times for writing or

reading data is specified, and specify the storage device with larger average

response time as one to be blocked.

Claims 5-7 (canceled).

8.   (currently amended)A disk array apparatus comprising:

a plurality of storage devices by which writing or reading data is

executed in such a way that, when there is caused an error in writing or

reading data into or from a storage area, writing or reading data is repeated

again until completed and thereafter notifying that writing or reading data has

been normally completed;

storage device control sections which include storing areas saving

requests for write or read operations of data into or from said plurality of storage devices, controls write or read operation of data into or from said plurality of storage devices, and receives notification that the write or read operation of data into or from said plurality of storage devices is normally completed;

channel control sections which receives a request for write or read operation from a network outside the disk array apparatus itself;

a shared memory in which pieces of control information communicated by said channel control sections and said storage device control sections are stored;

a cache memory in which pieces of data for communication between said channel control sections and said storage device control section are temporarily saved; and

a connecting section connected to said channel control sections, said storage device control sections, said shared memory, and said cache memory,

wherein said storage device control sections generate logical storage areas using said storage areas in said plurality of storage devices, said logical storage areas being used for writing or reading data and having redundancy to store data,

wherein said storage device control sections monitor said storing areas in which a request for writing or reading data into or from the plurality of storage devices forming the logical storage areas is stored,

wherein among said plurality of storage devices forming said logical storage areas, said storage device control sections specify a storage device,

6

for which a number of repeated times is large, and block said specified storage device~~The disk array apparatus according to claim 6~~,

wherein said plurality of storage devices have redundancy,

wherein said disk array apparatus further comprises:

a management terminal connected to the connection section,

wherein said management terminal sets conditions for specifying, among said storage devices with the redundancy, the storage device with a larger number of repeated times for writing or reading data,

wherein one of the conditions is a differential multiple of an amount of a piece of write pending data in the cache memory to be written into said storage devices.

9.   (currently amended)A disk array apparatus comprising:

a plurality of storage devices by which writing or reading data is executed in such a way that, when there is caused an error in writing or reading data into or from a storage area, writing or reading data is repeated again until completed and thereafter notifying that writing or reading data has been normally completed;

storage device control sections which include storing areas saving requests for write or read operations of data into or from said plurality of storage devices, controls write or read operation of data into or from said plurality of storage devices, and receives notification that the write or read operation of data into or from said plurality of storage devices is normally completed;

channel control sections which receives a request for write or read

operation from a network outside the disk array apparatus itself;

a shared memory in which pieces of control information communicated by said channel control sections and said storage device control sections are stored;

a cache memory in which pieces of data for communication between said channel control sections and said storage device control section are temporarily saved; and

a connecting section connected to said channel control sections, said storage device control sections, said shared memory, and said cache memory,

wherein said storage device control sections generate logical storage areas using said storage areas in said plurality of storage devices, said logical storage areas being used for writing or reading data and having redundancy to store data,

wherein said storage device control sections monitor said storing areas in which a request for writing or reading data into or from the plurality of storage devices forming the logical storage areas is stored,

wherein among said plurality of storage devices forming said logical storage areas, said storage device control sections specify a storage device, for which a number of repeated times is large, and block said specified storage device,

wherein said plurality of storage devices have redundancy,

wherein said disk array apparatus further comprises:

a management terminal connected to the connection section,

wherein said management terminal sets conditions for specifying, among said storage devices with the redundancy, the storage device with a larger number of repeated times for writing or reading data,~~The disk array apparatus according to claim 6,~~

wherein one of the conditions is a differential multiple of an average response time for each of said plurality of storage devices.

10.   (currently amended)A disk array apparatus comprising:

a plurality of storage devices by which writing or reading data is executed in such a way that, when there is caused an error in writing or reading data into or from a storage area, writing or reading data is repeated again until completed and thereafter notifying that writing or reading data has been normally completed;

storage device control sections which include storing areas saving requests for write or read operations of data into or from said plurality of storage devices, controls write or read operation of data into or from said plurality of storage devices, and receives notification that the write or read operation of data into or from said plurality of storage devices is normally completed;

channel control sections which receives a request for write or read operation from a network outside the disk array apparatus itself;

a shared memory in which pieces of control information communicated by said channel control sections and said storage device control sections are stored;

a cache memory in which pieces of data for communication between

said channel control sections and said storage device control section are

temporarily saved; and

a connecting section connected to said channel control sections, said

storage device control sections, said shared memory, and said cache

memory,

wherein said storage device control sections generate logical storage

areas using said storage areas in said plurality of storage devices, said logical

storage areas being used for writing or reading data and having redundancy

to store data,

wherein said storage device control sections monitor said storing

areas in which a request for writing or reading data into or from the plurality of

storage devices forming the logical storage areas is stored,

wherein among said plurality of storage devices forming said logical

storage areas, said storage device control sections specify a storage device,

for which a number of repeated times is large, and block said specified

storage device,

wherein said plurality of storage devices have redundancy,

wherein said disk array apparatus further comprises:

a management terminal connected to the connection section,

wherein said management terminal sets conditions for specifying,

among said storage devices with the redundancy, the storage device with a

larger number of repeated times for writing or reading data,~~The disk array~~

~~apparatus according to claim 6,~~

wherein one of the conditions is a differential multiple of a queue

number for each of said plurality of storage devices.

Claims 11 and 12 (canceled).

13.   (currently amended)A method for controlling a disk array

apparatus, said apparatus comprising:

a plurality of storage devices by which writing or reading data is

executed in such a way that, when there is caused an error in writing or

reading data into or from a storage area, writing or reading data is repeated

again until completed and thereafter notifying that writing or reading data has

been normally completed;

storage device control sections which include storing areas storing

requests for write or read operations of data into or from said plurality of

storage devices, controls write or read operation of data into or from said

plurality of storage devices, and receives notification that the write or read

operation of data into or from said plurality of storage devices is normally

completed;

channel control sections which receives a request for write or read

operation from a network outside the disk array apparatus itself;

a shared memory in which pieces of control information

communicated by said channel control sections and said storage device

control sections are stored;

a cache memory in which pieces of data for communication between

said channel control sections and said storage device control section are

temporarily stored; and

a connecting section connected to said channel control sections, said

storage device control sections, said shared memory, and said cache memory,

wherein said storage device control sections generate logical storage areas using said storage areas in said plurality of storage devices, said logical storage areas being used for writing or reading data and having redundancy to store data,

wherein said storage device control sections monitor said storing areas in which a request for writing or reading data into or from the plurality of storage devices forming the logical storage areas is stored,

wherein among the plurality of storage devices forming the logical storage areas, said storage device control sections specify a storage device, for which a number of repeated times is large, and block said specified storage device~~The method for controlling a disk array apparatus according to claim 11~~,

wherein said plurality of storage devices have redundancy~~;~~,

wherein said shared memory has areas which hold average response times for each of the plurality of storage devices~~;~~, and

wherein said storage device control sections compare said average response times among said plurality of storage devices with the redundancy when the storage device with a larger number of repeated times for writing or reading data is specified, and specify the storage device with larger average response time as one to be blocked.

14.   (currently amended)A method for controlling a disk array apparatus, said apparatus comprising:

12

a plurality of storage devices by which writing or reading data is executed in such a way that, when there is caused an error in writing or reading data into or from a storage area, writing or reading data is repeated again until completed and thereafter notifying that writing or reading data has been normally completed;

storage device control sections which include storing areas storing requests for write or read operations of data into or from said plurality of storage devices, controls write or read operation of data into or from said plurality of storage devices, and receives notification that the write or read operation of data into or from said plurality of storage devices is normally completed;

channel control sections which receives a request for write or read operation from a network outside the disk array apparatus itself;

a shared memory in which pieces of control information communicated by said channel control sections and said storage device control sections are stored;

a cache memory in which pieces of data for communication between said channel control sections and said storage device control section are temporarily stored; and

a connecting section connected to said channel control sections, said storage device control sections, said shared memory, and said cache memory,

wherein said storage device control sections generate logical storage areas using said storage areas in said plurality of storage devices, said logical storage areas being used for writing or reading data and having redundancy

13

to store data,

wherein said storage device control sections monitor said storing areas in which a request for writing or reading data into or from the plurality of storage devices forming the logical storage areas is stored,

wherein among the plurality of storage devices forming the logical storage areas, said storage device control sections specify a storage device, for which a number of repeated times is large, and block said specified storage deviceThe method for controlling a disk array apparatus according to claim 11,

wherein said plurality of storage devices have redundancy;, and

wherein said storage device control sections have areas which hold queue numbers for each of the plurality of storage devices, compare said queue numbers among said plurality of storage devices with the redundancy when the storage device with a larger number of repeated times for writing or reading data is specified, and specify the storage device with larger average response time as one to be blocked.

Claims 15-17 (canceled).

18.   (currently amended)A method for controlling a disk array apparatus, said apparatus comprising:

a plurality of storage devices by which writing or reading data is executed in such a way that, when there is caused an error in writing or reading data into or from a storage area, writing or reading data is repeated again until completed and thereafter notifying that writing or reading data has

14

been normally completed;

storage device control sections which include storing areas storing requests for write or read operations of data into or from said plurality of storage devices, controls write or read operation of data into or from said plurality of storage devices, and receives notification that the write or read operation of data into or from said plurality of storage devices is normally completed;

channel sections which receives a request for write or read operation from a network outside the disk array apparatus itself;

a shared memory in which pieces of control information communicated by said channel control sections and said storage device control sections are stored;

a cache memory in which pieces of data for communication between said channel control sections and said storage device control section are temporarily stored; and

a connecting section connected to said channel control sections, said storage device control sections, said shared memory, and said cache memory,

wherein said storage device control sections generate logical storage areas using said storage areas in said plurality of storage devices, said logical storage areas being used for writing or reading data and having redundancy to store data,

wherein said storage device control sections monitor said storing areas in which a request for writing or reading data into or from the plurality of storage devices forming the logical storage areas is stored,

wherein among the plurality of storage devices forming the logical

storage areas, said storage device control sections specify a storage device,

for which a number of repeated times is large, and block said specified

storage device~~The method for controlling a disk array apparatus according to~~

~~claim 16~~,

wherein said plurality of storage devices have redundancy,

wherein said disk array apparatus further comprise a management

terminal connected to said connecting section,

wherein said management terminal sets conditions for specifying,

among the storage devices with the redundancy, the storage device with a

larger number of repeated times for writing or reading data, and

wherein one of the conditions is a differential multiple of an amount of a

piece of write pending data in the cache memory to be written into said

storage devices.

19.   (currently amended)A method for controlling a disk array

apparatus, said apparatus comprising:

a plurality of storage devices by which writing or reading data is

executed in such a way that, when there is caused an error in writing or

reading data into or from a storage area, writing or reading data is repeated

again until completed and thereafter notifying that writing or reading data has

been normally completed;

storage device control sections which include storing areas storing

requests for write or read operations of data into or from said plurality of

storage devices, controls write or read operation of data into or from said

plurality of storage devices, and receives notification that the write or read

operation of data into or from said plurality of storage devices is normally

completed;

channel control sections which receives a request for write or read

operation from a network outside the disk array apparatus itself;

a shared memory in which pieces of control information

communicated by said channel control sections and said storage device

control sections are stored;

a cache memory in which pieces of data for communication between

said channel control sections and said storage device control section are

temporarily stored; and

a connecting section connected to said channel control sections, said

storage device control sections, said shared memory, and said cache

memory,

wherein said storage device control sections generate logical storage

areas using said storage areas in said plurality of storage devices, said logical

storage areas being used for writing or reading data and having redundancy

to store data,

wherein said storage device control sections monitor said storing

areas in which a request for writing or reading data into or from the plurality of

storage devices forming the logical storage areas is stored,

wherein among the plurality of storage devices forming the logical

storage areas, said storage device control sections specify a storage device,

for which a number of repeated times is large, and block said specified

storage device,

17

wherein said plurality of storage devices have redundancy,

wherein said disk array apparatus further comprise a management terminal connected to said connecting section,

wherein said management terminal sets conditions for specifying, among the storage devices with the redundancy, the storage device with a larger number of repeated times for writing or reading data, ~~The method for controlling a disk array apparatus according to claim 16~~,

wherein one of the conditions is a differential multiple of an average response time for each of said plurality of storage devices.

20.   (currently amended)A method for controlling a disk array apparatus, said apparatus comprising:

a plurality of storage devices by which writing or reading data is executed in such a way that, when there is caused an error in writing or reading data into or from a storage area, writing or reading data is repeated again until completed and thereafter notifying that writing or reading data has been normally completed;

storage device control sections which include storing areas storing requests for write or read operations of data into or from said plurality of storage devices, controls write or read operation of data into or from said plurality of storage devices, and receives notification that the write or read operation of data into or from said plurality of storage devices is normally completed;

channel control sections which receives a request for write or read operation from a network outside the disk array apparatus itself;

a shared memory in which pieces of control information

communicated by said channel control sections and said storage device

control sections are stored;

a cache memory in which pieces of data for communication between

said channel control sections and said storage device control section are

temporarily stored; and

a connecting section connected to said channel control sections, said

storage device control sections, said shared memory, and said cache

memory,

wherein said storage device control sections generate logical storage

areas using said storage areas in said plurality of storage devices, said logical

storage areas being used for writing or reading data and having redundancy

to store data,

wherein said storage device control sections monitor said storing

areas in which a request for writing or reading data into or from the plurality of

storage devices forming the logical storage areas is stored,

wherein among the plurality of storage devices forming the logical

storage areas, said storage device control sections specify a storage device,

for which a number of repeated times is large, and block said specified

storage device,

wherein said plurality of storage devices have redundancy,

wherein said disk array apparatus further comprise a management

terminal connected to said connecting section,

wherein said management terminal sets conditions for specifying,

among the storage devices with the redundancy, the storage device with a

larger number of repeated times for writing or reading data, and ~~The method for controlling a disk array apparatus according to claim 16~~,

wherein one of the conditions is a differential multiple of a queue number for each of said plurality of storage devices.